Impacts of agricultural research - towards an approach of societal values

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TITLE:

Towards a generic, comprehensive and participatory approach for assessing the impact of agricultural research in developing countries

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Abstract

International public agricultural research for development is increasingly requested to contribute to solving societal challenges related to food security, ecological transitions, climatic change and inequalities in development, among others. At the same time, in one strand of the scientific communities modalities and criteria to assess research are shifting towards demonstrating and explaining the causal link between research outputs and development impacts (Gaunand et al;, 2015).

This paper describes a novel approach for impact assessment of agricultural research conducted in a developing country context adapted from the "impact pathways" and ASIRPA approaches (e.g. Douthwaite and Gummert 2010; Joly et al., 2015). A key methodological choice was to give an active role in the assessment to the multiple stakeholders involved in innovation and/or impacted by it. This was considered essential to identify impacts and indicators that evaluation teams might not have thought of by themselves, and to understand the complexity of innovation processes eventually leading to impact, particularly in a developing country context for which accountability towards end-users of research is weak and availability of or access to reliable quantitative data is a challenge.

The resulting participatory methodology, called "Impress" (***IMP****act of* ***RES****earch in the* ***S****outh*) focuses on establishing and explaining the relationships between the outputs produced by research, the outcomes that involve and affect the actors directly or indirectly interacting with research and ultimately the primary and secondary impacts for development. After developing it iteratively over several years, CIRAD is currently testing it by assessing 13 case studies throughout Africa, Asia and Latin America. Cases cover a wide diversity of innovation domains (plant breeding, post-harvest processing, pest and disease management, value chains, etc.), research approaches (from transfer of technology to action-research) and innovation trajectories, some of which were assessed ex-post and others in itinere). The perimeter of each case study includes suites of consecutive or closely related research or R&D projects which took place around a common theme in a given area over time. Evidence and indicators of impact are being identified, measured and validated through multi-stakeholders workshops, focus groups, semi-structured interviews and surveys with key concerned stakeholder groups.

Initial results show a wide diversity of mostly positive impact types, including increases in production and incomes, improvement of the natural resources base, increased access to remunerative markets and at times changes in regulatory frameworks and policies, among others. Some impacts and indicators thereof were identified by the case stakeholders themselves, vindicating the choice of a participatory approach. Impacts seem linked among others to the development of and access to new knowledge and the strengthening of partnerships among stakeholders. Developing the capacities of stakeholders and of smallholder farmers in particular, also seems to have had a significant effect, which may have contributed to scaling out of some innovations.

After cross-analysing this round of case studies and addressing the methodological lessons and challenges, CIRAD will release by end of 2016 an improved, user-friendlier version of IMPRESS which may be used within and outside CIRAD. It also hopes to encourage its researchers and

Southern partners to adopt an “impact culture” so that they can adjust their research planning and practices in an ex-ante fashion, and in doing so, improve the probability their future research work will indeed contribute to more and better impact.

Keywords: impact assessment, innovation process, impact pathway, indicators, case study, capacity development

Highlights

- IMPRESS is a participatory approach to assess the impact of agricultural research in a developing country context, with a specific attention to capacity development.
- ImpresS relies on identifying changes, developing impact indicators, and assessing them as well as reconstructing innovations stories and impact pathways.
- Stakeholders are involved at key moments of the assessment process: in identifying impacts and indicators, in measuring impacts, in validating the results.
- A wide diversity of actual (ex-post) or hypothetical (in itinere) impacts was documented in a collection of 13 case studies.
- Developing an impact culture within an organization requires taking into account linkages between research outputs, outcomes and impacts.

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Introduction

Agricultural research for development is increasingly expected to contribute to solving societal challenges related to food security, ecological transitions, climatic change and rural development, among others. In doing so, it operates in a variety of contexts and partner with different types of stakeholders (researchers, farmers, advisory services, NGOs, private sector, etc.). In a context of acute tensions over funding dedicated to international agricultural research, donors and policy-makers expect researchers and their institutions to increase their accountability and demonstrate convincingly the causal links between public investments made in research and actual impacts achieved in terms of tangible development on the ground (Gaunand et al., 2015).

Responding to the above pressure, different approaches to assessing the impact of research have been developed over the last decades, with an emphasis on quantitative methods aimed at assessing policies and development projects. They focus either on measuring economic impact achieved and comparing it to the cost of research, or on measuring non monetary impacts (Penfield et al., 2014). They require extensive use of secondary macroeconomic data, or comparing situations with and without intervention, or before and after the intervention. They have worked rather well when the innovation developed by research is both fairly simple and rather easy to trace (e.g. new germplasm or new inputs used in a well circumscribed area). They suffer however from several limitations, especially perhaps when they are to be applied in contexts where innovations tend to be multi-dimensional (technological, social) and difficult to ascribe to a specific space, time and stakeholder, and when even seemingly simple data sets are hard and costly to come by and to access, a recurring challenge in developing countries.

Considering such limitations on the one hand, and on the other hand the complexities and peculiarities of the research situations it engages in across the developing world, CIRAD opted instead for a more comprehensive and participatory approach to assess the impact of its research. The overall objective was to develop and test through a case study approach a common, rigorous yet flexible approach with the potential to assess the impact of research that CIRAD and its Southern partners have conducted (ex-post) and are conducting (in itinere) in a variety of contexts. CIRAD's approach aims to address three key questions: (1) what has changed for local stakeholders as a result of CIRAD research interventions?, (2) why have such changes happened as they did, and what was the actual contribution of research in effecting them? And (3) how to characterize and measure the impacts of these changes? This paper presents key aspects of the corresponding approach CIRAD calls ImpresS (for IMPact of RESearch in the South). In the first section, the paper introduces the overall approach with a focus on its participatory components, along with a presentation of the 13 case studies used to test the approach. It then highlights selected results obtained in the case studies (impacts and impact pathways, what participation brought to the evaluation) and discusses key aspects and challenges related to the implementation and improvement of the ImpresS approach. It concludes with an exploration of what acquiring an impact culture may mean for an organization like CIRAD.

1. Key elements of the IMPRESS Approach

The IMPRESS approach as it stands today is the product of several iterations of reflection and testing within CIRAD. It started by a state of the art review (Saint-Martin et al, 2011), which allowed CIRAD to identify key objectives and principles of its approach to impact assessment, including the need to develop an impact culture within the organization and to be accountable not only to its donors, but also to its partners and end users. This was followed by four exploratory case studies (Alami et al, 2013), which laid the foundations for key methodological choices and highlighted a number of challenges that needed to be addressed. In 2014, CIRAD launched an organization-wide 'Innovation-Impact Task force' which set about to develop the IMPRESS approach presented below, test it and learn from a series of case studies.

1.1 A five-step evaluation process

In a nutshell, in its present state, IMPRESS is a comprehensive, theory-based and participatory approach to impact assessment of research which proposes a 5-step process (Figure 1):

1. The evaluation starts by defining the perimeter of the case study (innovations of interest, time period, geographical area) and by developing hypotheses about potential impacts, impact pathways and innovation stories (step conducted by the research team based on a review of available documentation);
2. The study is then framed with representatives of the key case stakeholders by discussing and validating the hypotheses developed in step 1 and by identifying / developing a list of impact descriptors;
3. Data are then collected to consolidate the innovation story and document the impact pathways and the corresponding causal relationships between inputs, outputs, outcomes and impacts[1];
4. The primary and secondary impacts are assessed by triangulating quantitative and qualitative data sources collected during step 3 or originating from secondary data;
5. The evaluation concludes by validating the final results (innovation story, impact pathways, impact assessment) with the representatives of the case stakeholders.

(Figure 1 here)

[1] **inputs**: the resources used by the research team to produce scientific results and products; **outputs**: the results produced by the research team (publications, technical novelty, etc); **outcomes**: appropriation of those results by the beneficiaries or intermediate stakeholders that lead to technological adaptation, new rules and new organizations ; **primary impacts**: impacts of the use of the innovation(s) on the stakeholders directly or indirectly interacting with research; **secondary impacts**: scaling out or scaling up of this innovation to other territories and audiences; spill overs (Barret et al., 2015).

1.2 Key concepts and principles

In developing ImpresS, CIRAD took inspiration from three related sets of approaches and experiences: the one developed and used extensively by CGIAR programs around “impact pathways” since the early 2000s (e.g. Douthwaite et al., 2003; Renkow and Byerlee, 2010), the one developed and applied in recent years by INRA in France to evaluate its own impact, known as ASIRPA (Joly et al., 2015), and the recent on-going efforts led by FAO (Ruane, 2014). While strongly related to these three approaches, IMPRESS also possesses original features which will be clarified in the following paragraphs.

Impact pathways

How agricultural research eventually contributes to producing impact or tangible changes is a complex multi-causal process. The latter involves multiple stakeholders and is influenced by factors which are both internal and external to the research and innovation process (Klerkx et al., 2012). They eventually all contribute in one way or another to the innovations developed and the related impacts actually observed. Under these conditions, conducting an attribution analysis of the role of research is challenging. Instead, ImpresS opted, as others had proposed and done before (Funnell and Rogers 2011; Mayne 2001; Joly et al., 2015) for relying on a contribution analysis of causal relationships between research inputs and impacts. Contribution analysis is structured around the iterative reconstruction of ‘impact pathways’. The impact pathway approach proceeds by inference for delivering causal explanations linking inputs, outputs, outcomes, primary and secondary impacts as well as the internal and external factors contributing to the impacts (Figure 2) (Mayne, 2008; Douthwaite and Gummert 2010; Joly et al., 2015).. The evidence necessary for structuring impact pathways is collected from multiple sources and with multiple tools, in a manner akin to judicial inquiry.

(Figure 2 here)

A case study approach

The ImpresS team opted for implementing a case study approach, deemed well adapted to the in-depth inquiry of a social object bounded in time and space about which ones wants to know particularly not only ‘what has happened?’ but also ‘how or why did it happen?’ (Gerring, 2004; Yin, 2009: Avenier and Thomas, 2015). .

Each case study focuses on the unique innovation process that took or is taking place in a given area over a definite period, starting with some kind of research intention and inputs, continuing with innovation development shared among various stakeholders (research being one of the contributors) and going all the way to some innovation(s) being actually by development actors and/or end users (usually farmers, but not always nor only) and producing some observable tangible changes, positives or negatives. Importantly, the ImpresS team did not focus on evaluating individual research or R&D projects per se, even though many interventions in a

developing country context are project-based. Rather, the innovation process of interest for ImpresS usually involved a cluster of several projects or R&D activities (consecutive or simultaneous) hypothesized to having had a common thread among them and coherent with the selected case perimeter in terms of theme, time and space (cf. Step 1 of ImpreS, Figure 1).

From the beginning, the ImpresS team wanted to go beyond the usual limitations of singular cases and very small samples by exploring diverse contexts, innovation types and processes, within its financial and human resources limitations. It was felt this would ensure ample ground for testing extensively the genericity of the proposed approach, as well as for accelerating the necessary individual and organizational learning, principally within CIRAD, attached to developing and using IMPRESS. This in turn was considered essential to be in a position to improve ImpresS further and to kick start an impact culture within CIRAD. Thus, the ImpresS team opted to develop multiple case studies simultaneously (13 for this iteration: see below) by applying a common framework and set of guidelines across cases, with the aim of standardizing data collection and easing subsequent cross-analysis. The ImpresS guidelines also incorporate built-in flexibility for adapting IMPRESS to the diversity of contexts and innovation processes existing among selected cases (Barret et al., 2015).

A focus on capacity development as a key factor contributing to impact

At several stages during the innovation process, and in varying modes and intensities, research interacts with other stakeholders (mainly advisory services, NGOs or farmers' organizations) in order to foster technical and social the design, appropriation and the use of innovations. Such interactions involve several types of learning processes (formal, informal, through networks, for individuals, groups, etc.); they contribute to strengthening the capacity of stakeholders in different dimensions related to the innovations being developed and adopted, including generating a stronger capacity to innovate (Leeuwis et al., 2014).

ImpresS proposes to map and analyze these capacity development processes by focusing on those involving research as a way to trace the intermediary its played in achieving the observed impacts. To this effect, it focuses on identifying key "learning situations" and understanding their implications in terms of outcomes or impacts generated thanks to the skills applied in practice as a result of such learning.

1.3 A participatory approach to impact evaluation

One of the explicit guiding principles when designing ImpresS was to give an active role in the evaluation process to the multiple stakeholders who were involved in each selected innovation process and case, or those impacted by it. Stakeholder considered in the evaluation process belonged to four categories of actors, beside the evaluators themselves (Freeman, 1994): major actors of the selected innovation process (e.g. researchers, farmers' organizations, NGOs, local authorities, advisory services, state, firms), opposed actors who resisted innovation, if any, influential actors (though not engaged in the innovation process directly), impacted actors.

Opting for an impact evaluation approach with an emphasis on strategic participation by local innovation stakeholders is justified on several grounds (Chambers et al., 1989; Barnaud, 2013). First, it is coherent with the increasing international interest for, and use of, more democratic and pluralistic approaches to evaluation, rather than relying solely on expert (and usually rather quantitative) evaluation. The key advantages of participatory evaluation from the viewpoint of ImpresS include a mix of ethical and operational considerations: (1) taking into account the diversity of points of view among concerned actors and the complexity of the links between research results and impacts, (2) complement as well as compensate the low reliability, unavailability of or restricted access to, secondary data, (3) decrease the cost and duration of the evaluation procedure. For the in itinere cases, 2 additional advantages can be listed: (1) contributing to develop the capacities of Southern Actors (as a result of the learning opportunity provided by the evaluation) and perhaps also enhance somehow the accountability of research towards them, and (2) enhance the potential utility and use of evaluation results by concerned local stakeholders themselves for adjusting on-going innovation dynamics, if they so wish.

All of the above contribute to giving credibility and legitimacy to evaluation through the ImpresS approach (Plottu and Plottu 2009). Furthermore, ensuring significant participation is especially relevant in a developing country context, in which asymmetries and power / resources imbalances between international researchers and development stakeholders can be massive and may have undesirable consequences if they are not mitigated, if only through explicit participation (Barnaud 2013). Last but not least, using a participatory approach contributes to educate the researchers about the expectations of the stakeholders of innovation. The IMPRESS team was however aware that participation is not without problems and challenges, including skills issue (as quality of the participatory processes may be as important as participation per se) and controlling for the bias of those actually able to participate (which might not represent all involved stakeholders or might have a particular relationship to researchers) vs. those who cannot be mobilized.

1.4 Main Tools

Applying ImpresS involves using a flexible combination of key “tools” during the evaluation process, in line with its objectives, its participatory nature and the resource limitations the ImpresS task force had to operate under (Figure 3).

Innovation stories and chronograms

A key tool, in line with options already developed in ASIRPA for example or within the CGIAR (Joly et al., 2015; Douthwaite and Ashby 2005), consists of reconstructing the innovation story during workshops, focus groups and interviews (see below) with the aim of eventually being able to represent it via a standardized chronogram. Chronograms appear to be an excellent and simple way to represent fairly complex, multi-step and multi-stakeholder innovation processes unfolding in an evolving internal and external environment. They are both a support of discussion with stakeholders during the evaluation process (as drafts, steps 2 and 5 in particular: Figure 1), and a key communicable synthetic result of the evaluation.

Participatory change descriptors and impact indicators

ImpresS, in keeping with its focus on participation, decided to invest significant time in impacts and indicators of impacts in a bottom-up participatory manner (O. de Sardan, 1995). A first step was to ask stakeholders to describe in their own words the kind of changes they had perceived or undergone ("descriptors of changes") as a result of using (or being affected by) a given innovation. On this basis, each evaluation team eventually formulated a handful of sense-making (from the view point of the stakeholders) realistic impacts and related "s.m.a.r.t" indicators. The indicators were then systematically informed in steps 3 and 4 of the evaluation process.

During the upcoming cross analysis of results the case studies, the IMPRESS team will pull together all the impacts identified at the case level and elaborate a typology of impacts. Also, the relative magnitude of change for each impact will be assessed by relying on guidance from research and development experts, in line with ASIRPA's use of panels of experts: Joly et al., 2015). .

Multi-stakeholder workshops

These workshops, organized in Step 2 and planned for step 5, consist of one- or two-day events involving representatives of key stakeholders of the innovation process. They include times during which the evaluation team presents its approach and hypotheses (in Step 2), or its results (Step 5). After which stakeholders are given sufficient time to give critical feedback and validate, correct or complement the proposals put forward by the evaluation team. Selection of participants and good facilitation are essential for ensuring the effectiveness of these events in achieving their stated objectives. Proper translation might also be needed especially for ensuring a fair level of farmer's input.

Focus groups and semi-structured interviews

Focus groups can be organized during steps 2 (as an alternative / complement to multi-stakeholder workshops), 3 (systematically), 4 (if needed). They involve usually from 3 to 10 purposefully-selected participants representing one or several stakeholder groups concerned by the innovation process or a given impact. The objective is to collect data or measure one or several specific impacts through relevant indicators. Like for multi-stakeholder workshops, choice of participants, good facilitation and translation are essential for the effectiveness of focus groups.

They may be articulated with semi-structured interviews depending on the result of the focus group, the level of tension among stakeholders and the familiarity with participatory processes of both the participants and the evaluation team.

(Figure 3 here)

Other rather classical tools such as closed surveys, secondary data, etc. were used at the data collection or measurement steps to complement the above tools and enhance the representativeness of results depending on the specific case and situation.

1.5 Case study selection

The case study selection for ImpresS started by identifying 77 long-term initiatives research teams from the 3 CIRAD departments had been actively involved with across continents and which seemingly had had some impacts on development (mostly positive at a first glance). Out of these 77, 58 were scrutinized closely according to seven dimensions (geographical area, type of partnership, outputs, nature of innovation, scale at which the innovation process unfolded, nature of impacts, area concerned by the impacts). The diversity of the 58 initiatives was subsequently classified in 3 groups of cases differing on the objective and nature of the research and innovation process and the nature of the impacts. Another key selection criteria was the commitment of the researchers having or had a role in these initiatives, to take part in the evaluation process, since each case was to become an actual "research project" and individual learning experience about impact assessment.

This combination of criteria eventually led to selecting 13 very diverse cases, representing 3 continents (9 cases in Africa, 2 in Latin America, 2 in Asia), and a diversity of innovation types (Table 1). Nine cases were considered as ex post case studies and 4 as ongoing or in itinere ones (actual impacts still forthcoming as of 2015). Including in itinere cases made it possible to consider emerging outcomes and impacts and to try and formulate impact hypotheses and impact pathways scenarios, all of which was seen as a good way to contribute to developing a culture of impact within the CIRAD research community.

The individual case study teams included systematically a CIRAD researcher as leader, a co-leader from the South in 9 cases (usually a researcher, and in 2 cases, a development partner), a Master's student attached to the team for a period of 6 months (for 10 cases out of 13), and an Impress taskforce's advisor belonging to the core IMPRESS task force and whose role was to accompany and advise the team on conceptual methodological issues. In February 2015, a training workshop ("école-chercheur") gathered members of the 13 case-study teams together with members of the core ImpresS task force, allowing participants to discover the ImpresS approach and get an initial hands-on training on major tools as well as take part in fine-tuning of the approach (the "official" ImpresS guidelines were released after this workshop). All cae study teams received support from an evaluation specialist throughout the data collection and analysis steps.

2. Result highlights

We will now focus on illustrating some of the initial results obtained in the 13 IMPRESS case studies. We will first examine the diversity of impacts and impact pathways, turn to an assessment of what participation brought to light, with a particular emphasis on in itinere cases and the role of capacity development. More quantitative results on the measurement of impacts as well as the systematic cross-analysis of all case studies will be presented in a follow-up paper however, as the corresponding analysis is still on-going.

2.1 An illustration of the diversity of impacts and impact pathways

A wide range of (mostly positive) impacts (or in several cases, what should rather be considered outcomes, particularly for the in itinere cases) were identified across the 13 ImpresS case studies, including increases in production and incomes, improvement of the natural resources base, better organization and networking, the development of new practices to resolve conflicts for example, the modification of stakeholders' perceptions, increased access to remunerative markets and at times changes in regulatory frameworks and policies. About half of them seem rather original compared to what is usually put forward in the evaluation literature (Merniz, 2015):

For instance, several types of impacts were identified in the case study on biological white grub control in the Reunion Island (Figure 4), such as positive environmental impacts, or social impacts such as the resilience of the whole value chain (Goebel et al, 2015). Some rather original spillover impacts were identified by the stakeholders themselves and not necessarily anticipated by the research team, such as improvement of the public image of some stakeholders, of the social cohesion and dialogue within the whole value chain, or the rise of environmental awareness as a whole.

(Figure 4 here)

Another interesting result is that the intensity of the observed impacts varied across the types of stakeholders surveyed within a given case. In other words, all stakeholders did not witness the same intensity of a given impact. In the rainfed Madagascar case, the evaluation team decided to use a simple typology of farmers (on the basis on how much rice they produced) to take such differences into account, rather than calculating an average impact for all farmer types. This allowed to show that larger rice producers were less impacted by the use of the new germplasm in terms of their food security, but more on their income generation capacity, while the opposite was true for smaller producers (see Figure 5, Rabouin, 2015).

2.2 What stakeholder participation in evaluation brought to light

Identifying impact through descriptors of changes formulated by the stakeholders themselves was one of the greatest originalities of ImpresS. It enabled the evaluation teams to explore unexpected or original impacts it would not have been able to identify on its own on the one hand (on the white grub case, 8 out of the 11 impacts identified came about through participation: Goebel et al., 2015) on the one hand. On the other hand it led to finding relevant indicators which in turn allowed collecting relevant field data. Even in cases for which the outcomes and impacts seemed rather straightforward - such as improved crop production or farmer income - measuring them through surveys or interviews can be quite challenging in contexts where farmers don't keep (written) records of their production or budget, a frequent occurrence with smallholder farmers.

In the case of the rainfed upland rice in Madagascar, exploratory interviews were held to explore the changes felt by farmers since the adoption of this new rice variety. Farmers could not provide answers to typical “technical” impact indicators such as an evolution of their income or of their purchasing power and indeed did not find them very relevant. Instead, they referred to the “peace of mind” and the “diminished worries” growing rainfed rice had given them, a much more holistic and relevant way of describing the (positive) evolution of their situation (Figure 5). Referring to “peace of mind” allowed most farmers to explain with relative ease the combination of factors linked to rainfed upland rice use that led to this impact, such as earlier and better harvest allowing farmers to avoid the former usual hunger gap period, during which they used to buy rice at top prices and had to work on the side to procure enough cash to be able to do so.

(Figure 5 here)

2.3 Use of impact pathways for in itinere assessment and scenario building

The ImpresS approach was applied to four on-going (“in itinere”) innovations (see Table 1). Despite such cases being in early stages of the innovation process, the participatory dimensions as well as the different tools included in ImpresS were rather successfully implemented. They enabled the evaluation teams both to assess on-going activities and to build scenarios to “improve” or to “make explicit” the potential future impacts of the innovation being developed. One such case addresses the co-construction of innovative approaches for the evaluation of animal health surveillance systems with the potential to be adopted by the Vietnamese ministry of Agriculture. At this early stage in the co-construction, only some outputs and outcomes have been achieved so far, such as the co-construction of animal health evaluation tools and some staff training. The participatory workshops organised with local stakeholders during the evaluation process were used to build several scenarios and identify different hypothetical impact pathways and causal links that may lead to the desired impacts. These workshops enabled both researchers and stakeholders to stand back from the routine project activities and to engage in fruitful discussions about the various risks, obstacles or challenges that the on-going innovation process could face in the future and different ways of bypassing them. Three scenarios were developed to improve the impact on the Vietnamese authorities: (1), a bottom-up lobbying process through rising civil society awareness to secure safe food, (2) a process relying on local government willing to implement these innovations and exerting pressure on the central government to support them, and (3) a direct influence through research and government networks.

2.3 Capacity development and scaling out effects

From the start, the IMPRESS team hypothesized that capacity development in its diverse modalities may play a large role in the innovation process and in achieving impact. Two case studies dealing with technical innovations (sorghum, rainfed upland rice) illustrate well the role it played in scaling out an innovation to a larger population (Trouche et al, 2015; Raboin et al, 2015) (Figures 5 and 6).

In both cases, research teams organized “learning situations” with farmers in the first phases of the innovation process. This involved testing new germplasm together, a setting allowing both researchers and farmers to learn about the new breed. It also involved learning about new cultivation techniques with the potential to improve production. These learning relationships over fairly restricted areas and a limited circle of actors led to the actual use of the new breed and the production of certified seeds which in turn caused the primary impact.

Capacity development was also instrumental in achieving secondary impacts (which concern a territory and population not directly involved in the first phase of innovation process), even though the corresponding scaling out process was not organized by the research team. It emerged because the first farmers involved in the innovation had engaged - as trainers - in informal sharing and learning situations with their neighbors and so on. Such scaling out supports our first findings about the positive impact of the innovation, as neighbors wished to adopt the new germplasm and cultivation techniques because they had observed an improvement in the farmer-innovators fields. Yet, it also revealed, for the rainfed upland rice case, that if germplasm are easily passed on, new cultivation techniques tend to fade away as the innovation scales-out, thus lessening the positive effects on rice production.

Easy access to an innovation is another enabling factor for scaling it out. In the case of new seed, learning how to produce it is not sufficient, it is also necessary to develop the corresponding value chain and the marketing of the produce for innovation to actually scale out. Even if farmers want to use a new seed they have seen producing positive results in their neighbours’ fields, they can only use it by being granted proper access to it. In the case of sorghum, the new seed was initially only available for sale in bags of 50 kg, a hefty and risky investment for a smallholder farmer willing simply in an initial step to test it on a small scale. This challenge was discussed in meetings between stakeholders. The solution found was to develop mini seed bags (0.5 to 1 kg) in order to limit the risks farmers were taking. This process illustrates the development of a marketing capacity among the stakeholders, who not only learned to organize the seed supply but also to anticipate a potential hindrance to its propagation.

Interestingly, such trainings and capacity building coupled to the participatory breeding process led to outcomes not anticipated by the research team. As a result, farmers were able to develop formal organisations, and the whole value chain of new certified seeds was strengthened. Overall, farmers were also able to promote the new seed autonomously and in doing so, contributed to scaling it out to farmers in other areas (Figure 6).

(Figure 6 here)

3. Discussion

At this still rather initial stage in the implementation of the IMPRESS approach, and before a thorough cross-analysis of cases and lessons is conducted, this approach has already proved its potential to fulfill the aims envisioned by CIRAD. IMPRESS allows, in a relatively short time frame and with modest human and financial resources, to understand pretty well rather long and complex multi-stakeholder innovation processes within their environment, and to assess the results and impacts achieved from the perspectives of diverse stakeholders groups, and through a variety of (mostly, but not only) participatory tools. The impact pathways reconstructed through the application of IMPRESS allow to identify and scrutinize the causal relationships leading to eventual impact, to specify the role of internal and external factors, and to isolate, as much as possible, research' own contribution. The relatively low cost of implementing ImpreS (with an average cost around 10 000 euros per case, including students' stipends but excluding researchers' salaries) is certainly a critical feature of this approach for facilitating its future routine use within CIRAD but also by partner organizations in developing countries. While figures are not publicly available, it seems to be an order of magnitude lower than the costs typically associated with more classical approaches to impact evaluation.

Beyond the many positive aspects listed above, the 13 Impress case study evaluation teams, together with the Impress task force backing them up, faced various constraints and challenges as they implemented and adapted the principles and methods proposed in the ImpresS guidelines.

A fist one was ensuring enough shared understanding of key evaluation concepts (e.g. impact, innovation, causality, outcomes, etc.) during the evaluation events and activities, which represented a different challenge for each stakeholder type involved, including the researchers themselves. Many practice-oriented stakeholders (farmers, extension staff for example) required translation of such concepts in everyday vocabulary ("change" instead of "impact" for example). And despite what was anticipated, not all were comfortable with visual diagrams for representing the hypothetical innovation story or impact pathways, even though they proved very valuable in general.

Another was avoiding evaluation biases introduced by researchers who were themselves part of the innovation process they were assessing (Conley-Tyler, 2005). The students who were associated to the evaluation team helped mitigate such bias.

Accessing "sufficient" and relevant data to measure impacts was also difficult. For instance, in the case of new germplasm, most of the time small farmers also grow conventional varieties alongside the introduced ones and therefore may struggle to distinguish which one led to which increase in income. Another problem is to get farmers to have a clear and homogenous idea of the situation with or without the innovation, or before and after the intervention, a challenge rather typical of any participatory, declaration-based appraisal of quantitative changes.

Another challenge was ensuring the "optimal" type and number of stakeholder representatives to involve in the evaluation process, and deciding who could best represent each of them (e.g. individuals and institutions closest to research vs. representatives of the larger farmer

population, poorer vs. wealthier farmers, winners vs. losers, etc.), without overlooking the need to involve singular innovation champions, irrespective of the stakeholder group they belong to.

Organizing effective workshops and focus groups, and particularly through ad hoc translation, is not always straightforward. This might be due to the influence of context-specific cultural norms in the dynamics of discussion (respect of the elder in Madagascar, culture of consensus in Vietnam or Indonesia, unequal influence of stakeholders on each other as a result of prevailing power relationships among them: Barnaud, 2013), or to the fact participants were not always readily available to participate (conflict with farming activities for example). Furthermore it was not easy to control the number and profile of actual participants (as some invited participants decided to bring along an interested neighbor or relative). In some cases, such challenges led the evaluation team to substitute focus groups by semi-structured individual interviews. On the other hand, focus groups proved quite efficient at collecting data in innovation cases for which participation and group discussions had been used extensively during the innovation process.

Managing time effectively also proved challenging: evaluation teams found it hard to cope with the conflicting demands on their limited time for adapting the approach and tools on the go (which IMPRESS requires, especially at this early stage in the formalization of the approach), implementing the many workshops, focus groups and interviews, preparing properly for the corresponding activities and exploiting the results between 2 sets of meetings. All of which happened during a span of just a few months of field presence and with lead researchers not always present in the country or involved in other activities beside the IMPRESS evaluation.

Managing expectations properly was also an issue especially in the in itinere cases. Confusion may have arisen in the mind of some participants between the objective of the assessment and ongoing project activities, in which members of the evaluation team were also involved. For example, some stakeholders wanted to take advantage of the evaluation workshops to put forward demands unrelated to the evaluation, or may have provided pleasing answers about some impacts and contributions of research in expectation of future support. This risk was bypassed in some cases by ensuring external facilitation of the events, or by opening space during the workshops to cater to issues and concerns other than those related to the impact evaluation. For ex-post cases, the challenge is almost the opposite: how to motivate stakeholders to invest time and energies to reflect back on “old” innovation processes is not straightforward, as they tend to be more interested in looking at (and solving) current problems.

Considering sufficiently long (several decades) time frames for evaluating properly the impacts of innovation processes which may continue evolving many years after research has stopped its involvement (Triomphe et al., 2013) is also a critical issue, and especially for the secondary impacts. Indeed, a number of case studies initially considered to be ex-post cases could probably best be classified as “in itinere”, because the innovation and scaling processes are still under way.

Another critical dimension for proper implementation of the ImpresS approach is its reliance and dependency on the skills of evaluation team members (researchers and students in particular) for conducting a participatory evaluation. While they learned to implement IMPRESS readily and to reconstruct impacts pathways, several of them, and especially researchers with a biophysical background did not possess strong skills or experience in conducting and facilitating a rigorous

participatory process, based on workshops, focus groups and semi-structured interviews. While external resource persons were sometimes identified and hired for mitigating this challenge, it was not always possible due to local shortage of skills and to budget limitations, nor was it necessarily desirable: learning by the research-led evaluation team was also a major aim of IMPRESS.

Some of the above challenges may seem trivial and indeed were for the most part avoided or minimized as they emerged. When no good solution could be identified, they affected partially the achievements of some individual case studies. Hence the extent to which each case study was able to overcome them will have to be assessed thoroughly during the upcoming cross-analysis of results, during which the ImpresS team will strive to come up with generic and valid conclusions and lessons (Avenier and Thomas, 2015).

Beyond the specific challenges discussed above, an overarching question is how realistic it was to foment and expect a genuine participation within the time frame of a short evaluation process (a few months of fieldwork), especially for cases in which participatory approaches were not used much during the innovation process itself. This is all the more relevant that evaluation objectives might have remained ambiguous or misunderstood by the participants (why are such evaluations being done, what will the results be used for, etc.), that discussions requiring precise understanding and interpretations happened through translation and in a cultural context not necessarily leading to frank or free-flowing voicing of opinions and experiences (see above). In the end, what ImpresS tried to do is not to fall in the trap of the "tyranny of participation" (Cooke and Kothari, 2001), but to identify the appropriate places, times and methods for effective and "useful" participation.

Conclusions and perspectives

Preliminary results obtained from the 13 case studies conducted by CIRAD using its newly formalized ImpresS approach show a number of advances and valuable lessons in terms of understanding better impacts pathways and the role of research and of improving the design of the approach itself.

The first one is the intrinsic value of a comprehensive impact pathway approach, focused on understanding the 'why' and the 'how' of impact and not just on quantifying impact per se. It proves if need be that research cannot continue to see itself as a simple output provider in a mostly linear innovation process: twists and unexpected turns are countless all along the innovation process, stakeholders' contributions to achieving outcomes and impacts are significant throughout, and research has to constantly adjust its activities and approach to ensure it remains relevant to the requirements of supporting the innovation dynamics long enough and adequately enough (which requires research to play different roles at different stages of the process, including in intermediation and capacity development) to achieve an actual impact.

A second lesson rests with the principle and degree of participation of stakeholders in the evaluation process. Without any doubt, the choice made in ImpresS to go for a participatory assessment process has been vindicated by the initial results obtained across the 13 case

studies, despite the challenges discussed above and even though different methodological aspects must be further improved to ensure participation is genuine and brings on-board all of its potential.

A third lesson is the need for a flexible design but also implementation of the ImpresS approach, allowing evaluation teams to adjust the generic approach to the specificities of the local context and innovation process, and to the eventual assessment objectives negotiated with development stakeholders. This flexibility, which might express itself in the form of a toolbox approach in the future, has to happen without however losing track of the need for enough standardization to ensure comparability of results across cases, and without losing the necessary rigor of implementation.

As CIRAD wraps up its case studies, conducts a thorough cross-analysis and identifies or confirms the main lessons to be incorporated in a refined, user-friendlier version of ImpresS, how to go forward with developing an impact culture within CIRAD, both at the researcher and at the organizational level, as well as with its main Southern research partners will become a central concern.

Once consolidated, pushing for a more ex-ante incorporation of some of the very same principles on which ImpresS is based will hopefully not scare away researchers worried about an undue and potentially dangerous “piloting of research by impact”. On the contrary, it is hoped it may contribute to enriching existing research approaches in their diversity of goals and modalities and to making research teams more sensitive and more responsive to the needs and objectives of development partners, whenever desirable and possible.

This may imply introducing a number of changes in the way researchers operate routinely at every step of the research and innovation process. During the planning phase (in ex-ante mode), it may imply co-designing questions to be addressed and the corresponding research (or R&D) set-ups, considering a larger range of stakeholders, as well as co-designing a range of scenarios of hypothetical impacts pathways and associated theories of change, and building a joint M&E system with indicators that make sense for the various partners. During the implementation phase (in itinere mode), this may imply considering new activities (especially around capacity development), conducting more systematic or more efficient participatory research whenever possible, or adjusting periodically set-ups, approaches or proposed impact pathways based on iterative learnings achieved on the way about what works and what doesn’t along the hypothesized impact pathway. And in the validation phase, it may imply better communicating about results (impacts) achieved and their implications, disseminating them better, and interacting better with among others policy makers for optimizing scaling out and up. All the above changes require going beyond the usual and rather slow or erratic learning by doing of researchers, and rather accompanying them formally in acquiring the corresponding skills.

Besides such internal learning objectives, CIRAD will also engage in developing better and more convincing evidence-based story-telling and accountability about the impacts of its research, directed at its key partners, the general public, its donors and supervisory bodies, in keeping with its core institutional values and commitment to research for development in partnership with stakeholders from developing countries.

References

Alami, S., Barret, D., Bienabe, E., Temple, L., 2013 : Evaluation d'impact de la recherche au Cirad. Rapport de la cellule impact. CIRAD, Montpellier

Avenier M-J and Thomas C, 2015: Finding one's way around various methodological guidelines for doing rigorous case studies: a comparison of four epistemological frameworks. Systèmes d'information & management (20) 61-98.

Barnaud C., 2013 : La participation, une légitimité en question. NSS 21, 24-34

Barret D, Clavel D, Dabat M-H, Faure G, Mathé S, Temple L, Toillier A, Triomphe, B, 2015: IMPRESS (IMPact des REchercheS au Sud). Guide méthodologique sur l'évaluation des impacts de la recherche agronomique dédiée aux pays du sud. CIRAD, Montpellier, 103 p.

Chambers, R., Pacey, A., Thrupp, L.A., 1989: Farmer First: Farmer Innovation and Agricultural Research, London, Intermediate Technology Publications.

Conley-Tyler, M. 2005: A fundamental choice: internal or external evaluation?. *Evaluation Journal of Australasia*, *4*(1/2), 3.

Cooke B. and Kothari U. 2001: Participation: The new tyranny?. Zed Books.

Douthwaite, B., Kuby, T., van de Fliert, E., Schulz, S., 2003: Impact pathway evaluation: an approach for achieving and attributing impact in complex systems. Agricultural Systems 78, 243–265.

Douthwaite B. and Ashby J., 2005: Innovation Histories: A option for learning from experience. ILAC Brief 5. ILAC, Bioversity; Rome

Douthwaite B. and Gummert M., 2010: Learning selection revisited: How can agricultural researchers make a difference? Agricultural Systems 103 (5). 245-255

Duflo E., Glennerster R., & Kremer M., 2007: Using randomization in development economics research: A toolkit. Handbook of development economics, 4, 3895-3962.

Dumez, 2011 : Qu'est-ce que la recherche qualitative? Le Libellio d'Aegis, 2011, 7 (4).47-58.

Freeman, R. E. 1994. The politics of stakeholder theory: Some future directions. Business Ethics Quarterly 4: 409-421.

Funnel S., Rogers P., 2011. Purposeful Program Theory, Effective use of Theories of Change and Logic Models. Jossey-Bass, Chichester.

Gerring, J., 2004, What Is a Case Study and What Is It Good for?, The American Political Science Review 98 (2): 341–354.

Goebel R., Martin P., Mourret N., Paillat J-M., Roux E., 2015 : Lutte biologique contre le ver blanc de la canne à sucre, Interim report, CIRAD Montpellier

Gaunand, A., Hocdé, A., Lemarié, S., Matt, M., & De Turckheim, E., 2015 : How does public agricultural research impact society? A characterization of various patterns. Research Policy, 44(4), 849-861

Joly P-B., Gaunand A, Colinet L, Larédo P, Lemarié S, Matt M, 2015: ASIRPA: A comprehensive theory-based approach to assessing the societal impacts of a research organization. Research Evaluation, doi: 10.1093/reseval/rvv015

Klerkx, L., Mierlo (van) B., Leeuwis, C., 2012: Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions. In Darnhofer I., Gibbon D. and Dedieu B. (eds.), Farming Systems Research into the 21st Century. The New dynamic, Springer, Netherlands, 457-483

Mayne J, 2001: Addressing Attribution through Contribution Analysis: Using Performance Measures Sensibly. The Canadian Journal of Program Evaluation 16 (1), 1□24.

Mayne J, 2008: Contribution analysis: An approach to exploring cause and effect, ILAC brief 16, CGIAR, May 2008

Merniz H., 2015 : Mesure de l'impact de la recherche, Méthode d'évaluation participative multicritère, Université d'économie de Montpellier/Cirad.

Olivier de Sardan, J. P. (1995). La politique du terrain. Sur la production des données en anthropologie. Enquête. Archives de la revue Enquête, (1), 71-109.

Penfield, T; Baker M.J.; Scoble R and Wykes. M.C.,2014: "Assessment, Evaluations, and Definitions of Research Impact: A Review." Research Evaluation, 23(1), 21-32

Plottu B., Plottu E. 2009: Contraintes et vertus de l'évaluation participative. Revue française de gestion 192, (2), 31-58.

Raboin L-M., Breumier P., Ramanantsoanirina A., Dabat M-H., Marquie C., Ramarosandratana A., 2015 : Le riz pluvial d'altitude à Madagascar, interim report, CIRAD Montpellier.

Renkow, M. Byerlee D., 2010: The impacts of CGIAR research: A review of recent evidence. Food Policy 35(5), 391-402.

Ruane, John. 2014. "Approaches and Methodologies in Ex Post Impact Assessment of Agricultural Research: Experiences, Lessons Learned and Perspectives," Rome, FAO.

Saint-Martin G., Alami S., Arvanitis R., Barret D. Bertrand B. Colinet L., Delarue J., Faure G., Letourmy P., Mourzelas M., Pallet D., Temple L., Vagneron I. (2011) Evaluation de l'impact de la recherche au Cirad, Montpellier : CIRAD, 44 p.

Triomphe, B, Floquet A., Kamau G., Letty B., Vodouhé S.D., Ng'ang'a T., Stevens J.B., Van Den Berg J., Selemna N., Bridier B., Crane T., Almekinders C., Waters-Bayer A., Hocdé H. (2013): What does an inventory of recent innovation experiences tell us about agricultural innovation in Africa? Journal of Agric. Educ. Extension. 19 (3) 311-324

Trouche G.,Guillet, M., Vom Brocke K., Temple L., 2015 : La sélection participative du sorgho au Burkina Faso, Interim report, CIRAD Montpellier.

Yin, R., 2009: Case Study Research. Design and Methods. Sage Publications, Thousand Oaks, 4th ed.

TABLES and FIGURES

Table 1: Key characteristics of the 13 cases selected for testing the IMPRESS approach to impact evaluation

Country, region	**Case study**	**Type of evaluation**	**Timeline**	**Stakeholders involved in the innovation process**	**Scale**
Senegal groundnut basin	Groundnut breeding and seed production	Ex-post	2003-2015	*Farmer organization*, *University, national research*	regional
Burkina Faso (boucle du Mouhoun, and Center-North)	Participatory Sorghum breeding and seed production	Ex-post	1995-2010	local research, individual and small-group farmer innovators, farmer organizations, Ministry of Agriculture	international
Madagascar, highlands of Vakinankaratra	Participatory assessment of rainfed upland rice varieties	Ex-post	2006-2014	farmers, local research, civil society stakeholders, regional ag development services, agricultural training center	regional
Dominican Republic	Diffusion of a coffee berry borer trap	Ex-post	1997-2008	National coffee institute, national research	national
Reunion Island (France)	Biocontrol of a white grub in sugarcane	Ex-post	1981-2007	Sugarcane value chain stakeholders, local research, Regional government, Mauritius Government, Ministry of Research, Ministry of Agriculture, City halls, bank, Private distributors, Farmers Trade Union	regional
Burkina Faso, Tuy region	Manure management in agro-pastoral systems	Ex-post	2005-2015	Farmers and farmers organizations, local and regional extension, local research, NGO	regional
Mali/Burkina-Faso	Fonio huller/whitener	Ex-post	1990-2015	Folio value chain stakeholders, local research in Mali and Burkina Faso, NGOs	national
Brasil, Santa	Geographical indications	Ex-post	1996-	Farmers' organizations, research,	regional

Catarina			2015	extension, local governments, small businesses	
Senegal, Niayes area	Tsetse Fly eradication	In-itinere	2007-…	farmers associations, local research, Civil society stakeholders, Vet Services, Ministry of Agriculture, FAO, USDA	regional
Vietnam	Alternative approaches for the evaluation of animal health surveillance systems	In-itinere	2006-….	farmers, agro-food industries, Universities (national, international), National Institute for Animal Health	national
Reunion Island	co-design of regional organic residue recycling scenarios	In-itinere	2010-…	*O*rganic waste producers, fertilizer sector, research, local, regional and national government representatives, transfer & innovation cluster	regional
Indonesia, central Java	Integrated and Participatory Water Resources Management	Ex-post	2006-2014	Farmers, local water user associations, national & local research, NGO, government agencies, private business (Danone)	watershed

Figure 1: The five steps of the Impress approach (Source: Barret et al., 2015)

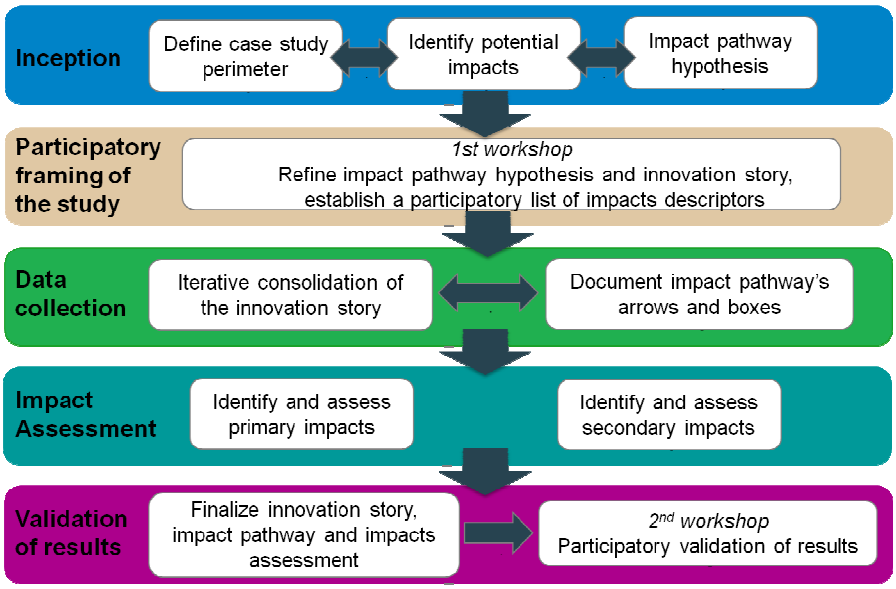


Figure 2: A conceptual impact pathway showing causal links between inputs, outputs, outcomes and impact

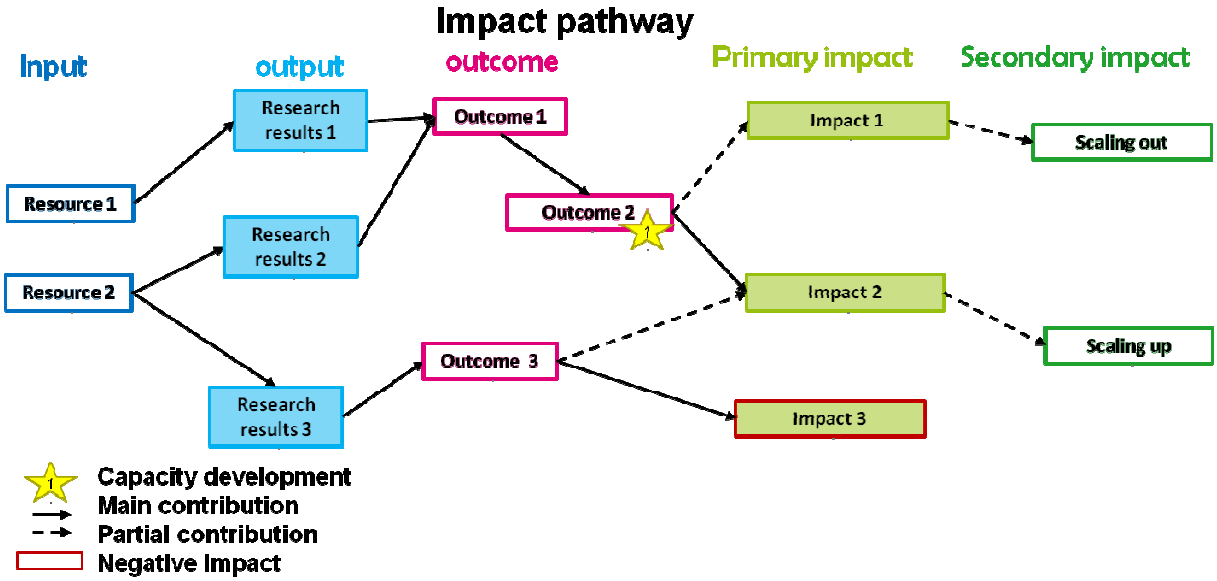


Figure 3: Key methods and tools used as part of an ImpresS evaluation process, with a focus on those allowing stakeholder participation.

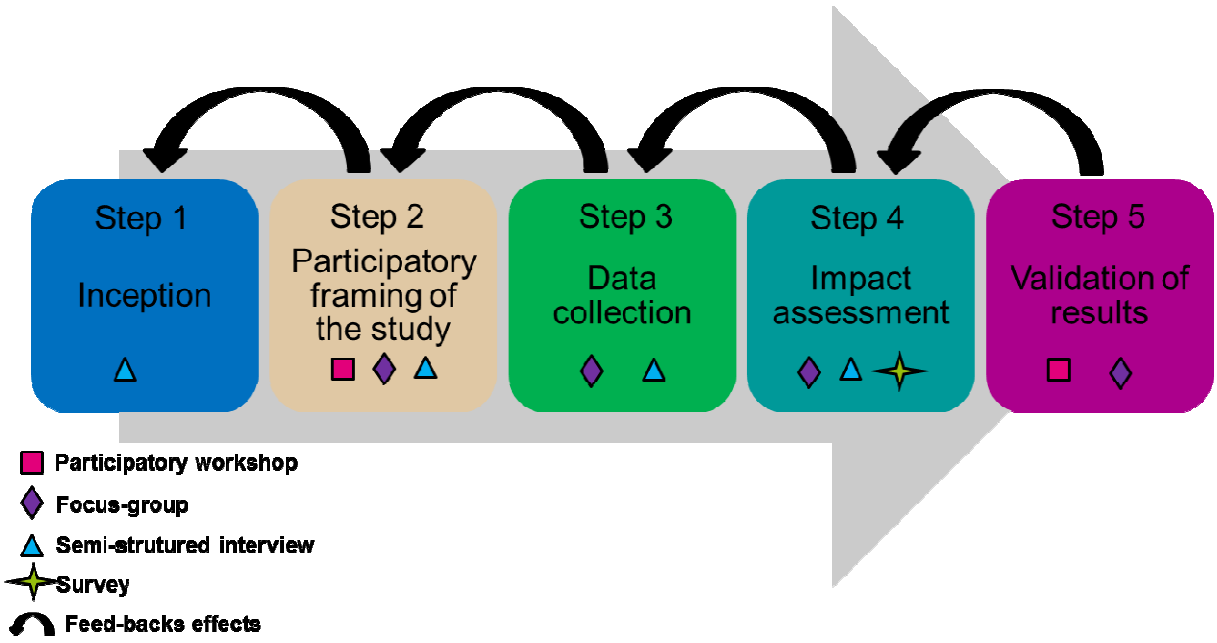
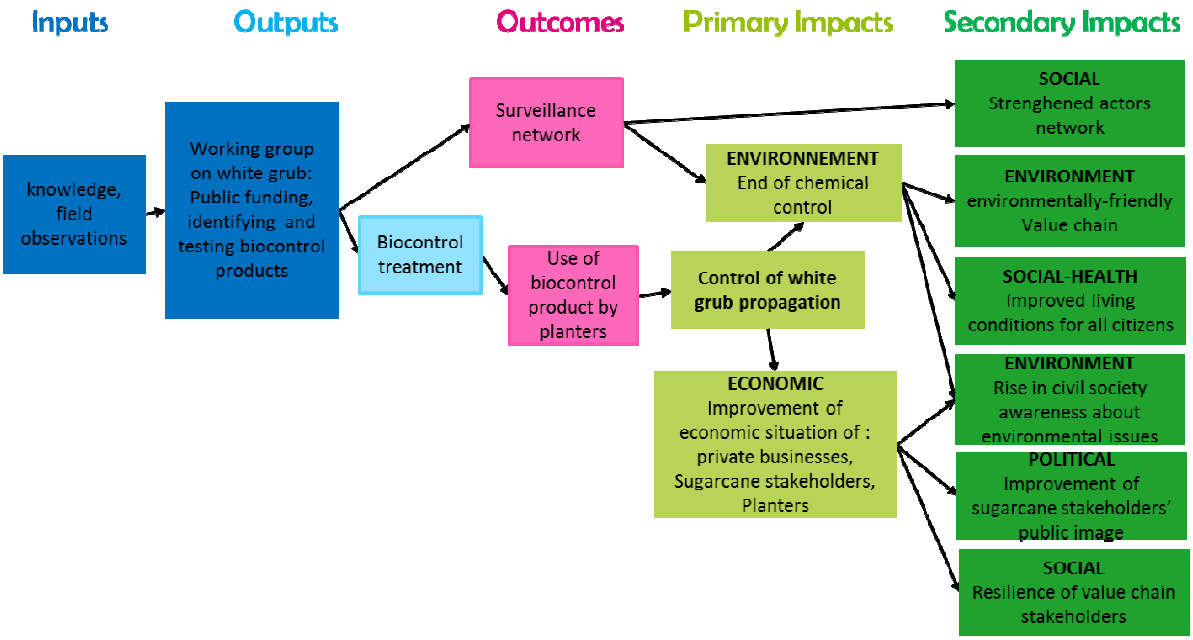
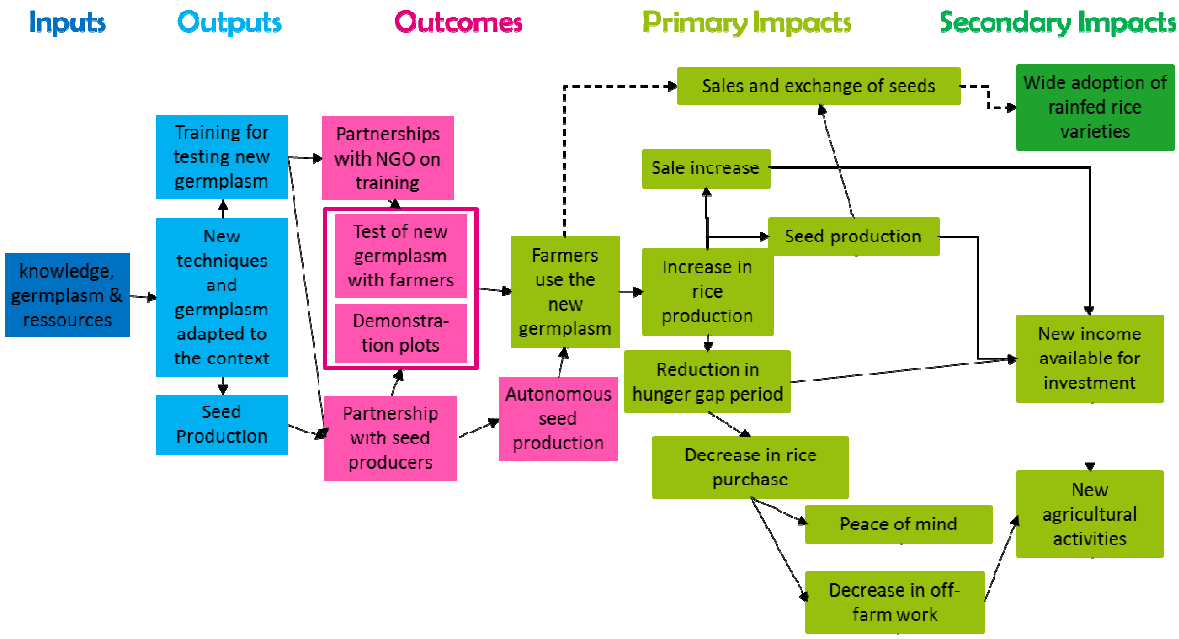


Figure 4: Simplified impact pathway of the biological white grub control in the Reunion Island case study



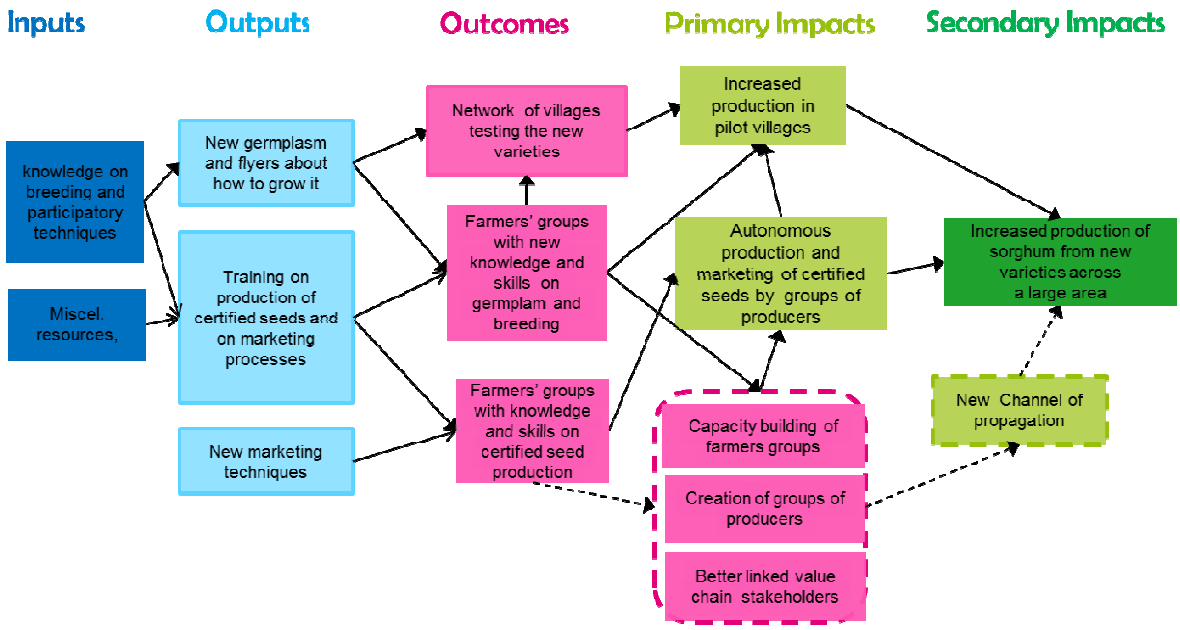
(source: Goebel et al. 2015)

Figure 5: Simplified impact pathway of the rainfed upland rice case study (Raboin et al. 2015)



(Source: Raboin et al. 2015)

Figure 6: Simplified impact pathway of the Sorghum breeding case study, showing the "Scaling out" secondary impact (in dotted line: unintended farmer-to-farmer promotion channel)



(Source: Trouche et al. 2015)